

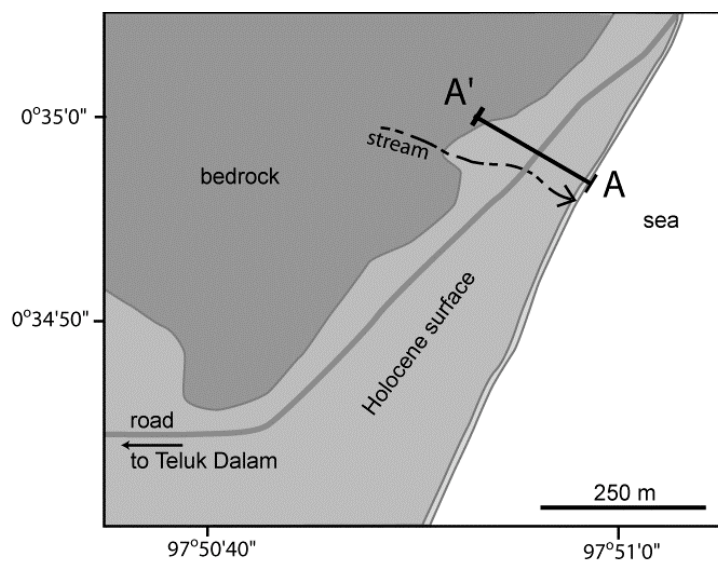
Auxiliary Material

In this section we describe study sites that are not included in the main body of the paper. We also include a table summarizing all dates and elevation measurements at each study site we visited (Table S1).

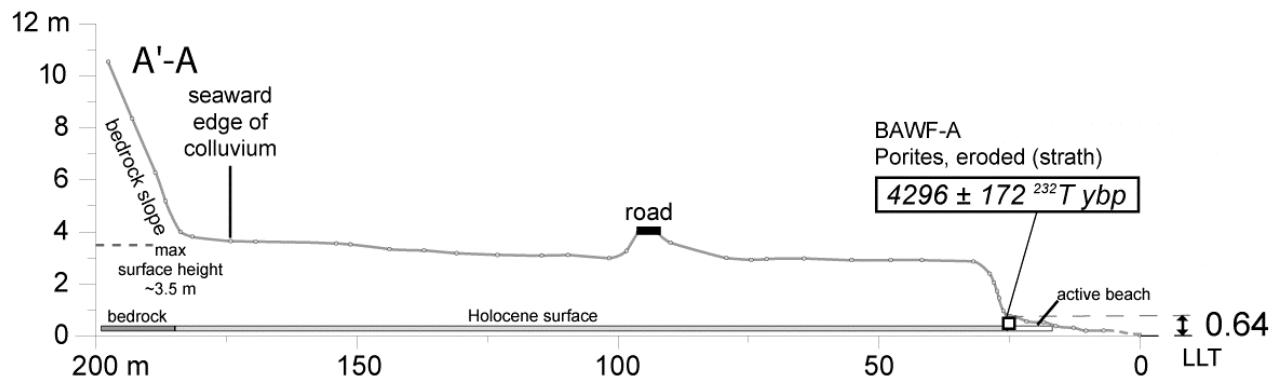
Maps of each site follow the site descriptions. Site locations are shown in Figure 2 of the main paper.

BAWF (Bawonifaoso)

This site is located near the SE tip of Nias, on a low coastal terrace that is continuous with the extensive rice fields east of Teluk Dalam. The maximum height of the surface is ~3.5 m above LLT, and pits and stream exposures show that the bulk of the deposit is composed of beach deposits of coral rubble and sand. Surficial berms are subdued. Inland excavations did not expose in-situ coral heads, but recent erosion of the low coastal cliff exposed large Porites heads forming a discontinuous abrasion surface. The U-Th age (4296 ± 172 ybp) and elevation (0.64 m) of one of these heads (sample BAWF-A) offers an apparent minimum uplift rate of 0.22 mm/year. Application of corrections for 2005 coseismic motion (-0.3 m) and Holocene RSL (1.45 m) results in an apparent subsidence rate of -.12 mm/year. Because eroded head BAWF-A obviously underestimates uplift, we calculate a maximum uplift rate using the elevation of the Holocene surface itself. We divide the maximum height of the terrace (3.5 m) by its maximum age, which we take to be $6,500 \pm 500$ years old on the basis of the oldest ages we obtain for elevated Holocene surfaces on Nias. We apply corrections for RSL highstand and 2005 coseismic uplift to yield a maximum uplift rate of $0.3 \pm .21$ mm/year. We interpret this range of uplift rates (-0.12 to 0.3 mm/year), in conjunction with the flat paleoreef surface, to indicate that the coast is nearly stable or uplifting very slowly here.



BAWF (Bawonifaoso)

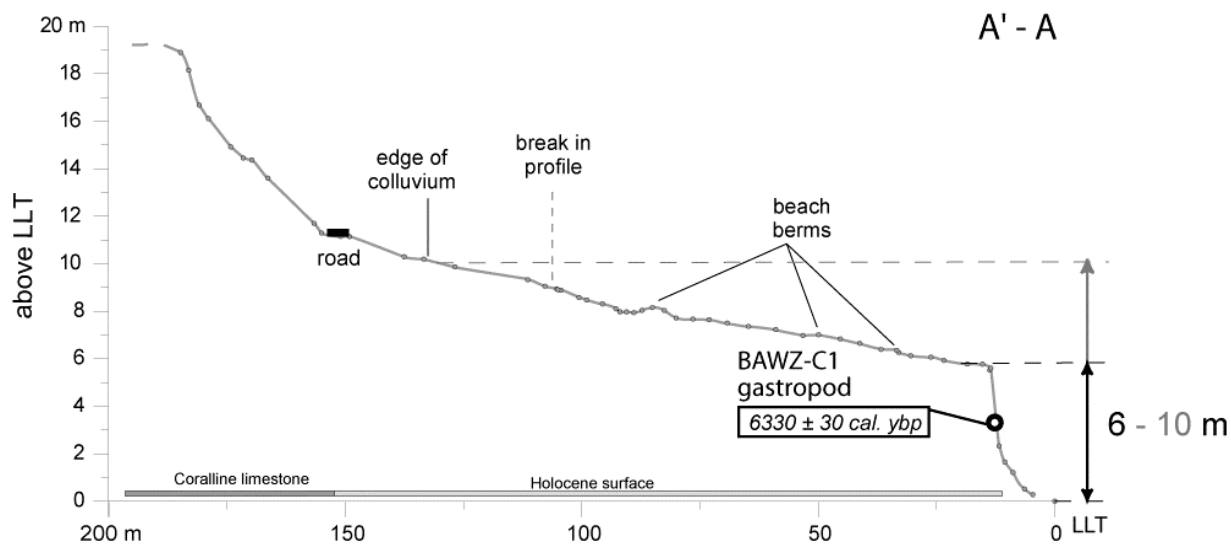
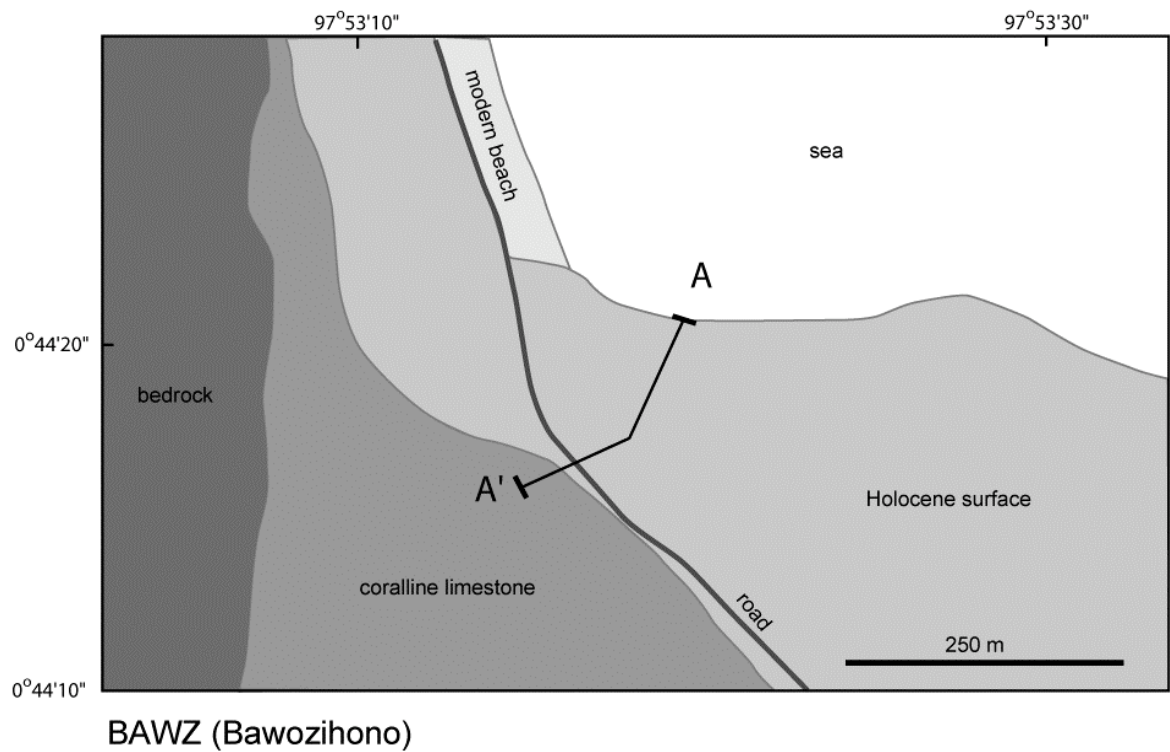


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BAWZ (*Bawozihono*)

Site BAWZ is located on the northern end of a prominent rounded cape along the SE coast of Nias. A ~6 m coastal cliff bounds the seaward side of the Holocene terrace, which tilts downward 2-3° in the seaward direction. The maximum height of the surface is ~10m where it is set into coralline limestone that forms an obviously older, higher (20+ m), deeply dissected surface.

Beach berms make up the Holocene surface, but unfortunately no in-situ corals were exposed in pits or in the extensive coastal cliff. To place a maximum bound on the age of the 6 m high surface directly at the coast, we obtained a ^{14}C date of 6270 ± 30 cal. ybp on a marine gastropod from the cliff exposure (sample BAWZ-C1; table S1). The ^{14}C age provides a maximum bound on the age of the surface and thus a minimum bound on the uplift rate of $0.62 \pm .13$ mm/year. To estimate the maximum uplift rate, we divide the highest elevation of the landward edge of the Holocene surface (~10 m) by an assumed maximum age ($6,500 \pm 500$ years) to yield (with appropriate corrections) $1.29 \pm .29$ mm/year. Thus the uplift rate here is between ~0.6 and ~1.3 mm/year.

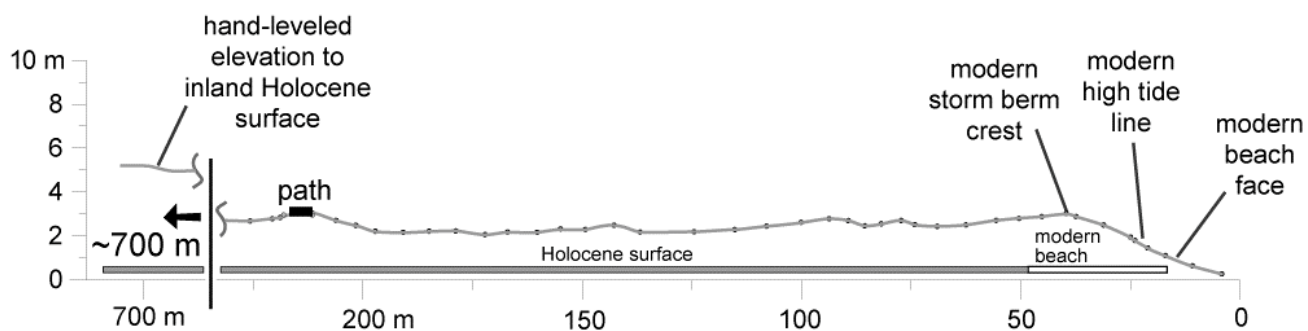
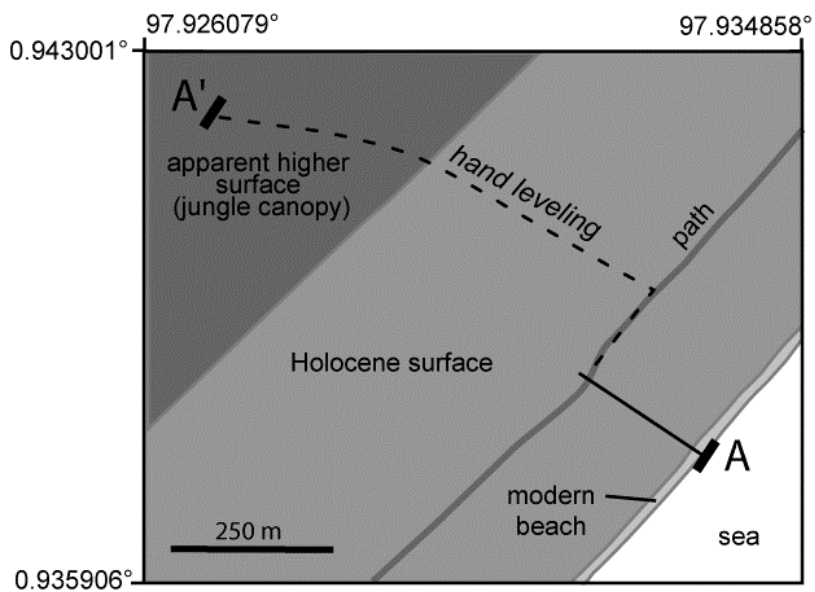


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DHNA (Dahana)

This transect is near Dahana village, on the south edge of the Onolimbu coastal plain in a region that is nearly completely inaccessible by road. The surface here is a very extensive chenier plain, with laterally continuous, well-formed beach berms composed nearly purely of sand-sized and smaller material. SRTM elevation data show an apparent 20-25 m high, continuous surface beginning ~ 500-600 m from the coast and continuing landward. We combined a short total station survey with a longer hand-leveled line to construct a topographic transect that extends well into the apparent higher ground. We found that the elevation increase was constant but gradual over the transect, and that the apparent higher surface shown in the SRTM data was entirely due to returns off a very dense jungle canopy with a very sharp seaward boundary, possibly reflecting the limit of a shallow groundwater table. The dark, continuous vegetation comprising the SRTM returns is obvious on Landsat imagery. Extensive logging was taking place at the time of our visit and we anticipate that future remotely-sensed topographic datasets will reveal the true ground elevation of 5-6 meters here.

Because this site is on a gently sloping, heavily-vegetated portion of the coastal plain far from higher ground, we could not survey the entire width of the Holocene surface. Moreover, the complete absence of coral and the preponderance of only well-sorted beach sands and sparse, obviously reworked shells precluded meaningful dates along our transect. An important qualitative result from this site is that continual Holocene uplift has taken place here despite coseismic subsidence of 0.25 m in 2005. We can estimate an uplift rate here by assuming an $6,500 \pm 500$ year old age for the 5-m-high surface, yielding $0.83 \pm .25$ mm/year when appropriate 2005-coseismic and Holocene RSL corrections are applied. Because our transect does not extend to the seacliff backing the Holocene surface, this is a minimum Holocene uplift rate for the coast here. The structures responsible for the uplift of the Onolimbu coastal plain are unknown, but uplift may be due to a series of west-dipping backthrusts that project to the surface east of the coastal plain in the strait (Fig. 3).



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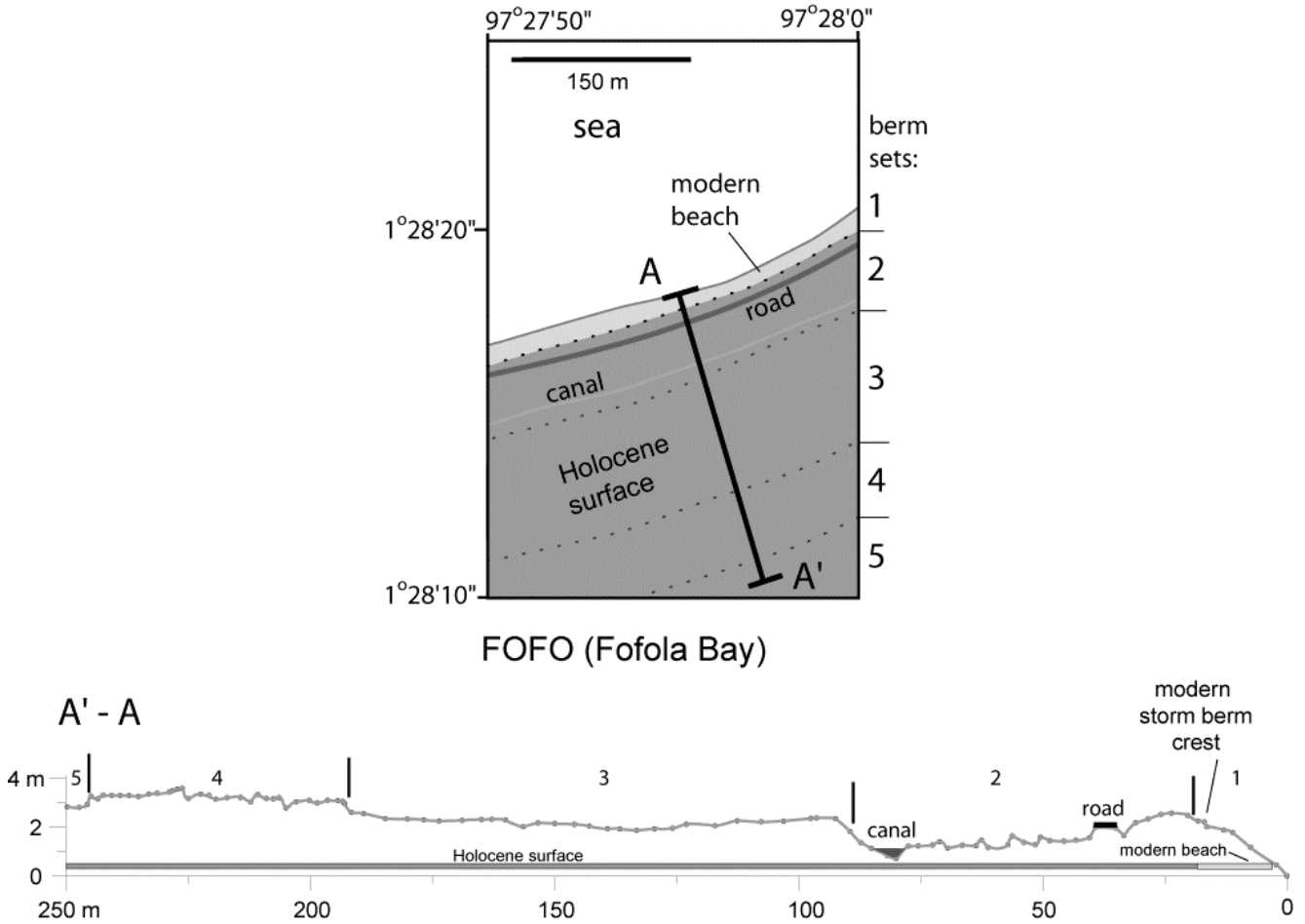
FOFO (Fofola Bay)

The Fofola Bay site is located just over 2 km west of the site LAYA. The FOFO transect extends 250 m inland across a series of recessional beach berms, and thus serves as an interesting comparison to the nearby LAYA transect which is situated on an upraised paleoreef. The FOFO transect crosses distinct sets of beach berms. The sets can be differentiated on the basis of berm elevation and frequency, and on the clear and abrupt elevation transitions between each set. Successively younger, oceanward berm sets appear to have an inset relationship with older, generally higher sets. We infer a Holocene age for the berms at FOFO on the basis of their sharp crests. The highest berm elevations at FOFO are ~3.25 – 3.5 meters above LLT, while the top of the nearby Holocene reef at site LAYA is at maximum ~2.5 – 2.75 meters. The difference of 0.5 – 1.0 m may reflect the tidal range.

An interesting feature of the FOFO site is that the lowest Holocene berm set (labeled ‘berm set 2’) gains elevation in a seaward direction, as the berm crests climb from ~1 m above LLT to ~2.5 m above LLT. A canal has been dug into the lowest back-berm depression of this berm set to take advantage of the natural low spot here. We observed this inset, coastward-climbing berm geometry frequently on the chenier plains of Nias. If each berm set represents readjustment of the chenier plain due to the earthquake cycle, the climbing berm crests may represent slow subsidence in the interseismic interval as the beach progrades. However, the older, higher berm sets don’t appear to reflect the same process here, and so we are left unsure how to interpret the single set of climbing berms at FOFO.

Another interesting feature of the FOFO site is that there is net uplift here, despite the fact that the site is located in an apparently active syncline and is only a few kilometers west of the hingeline in 2005. In this regard, the site is different from the clear subsidence we observe at Lahewa.

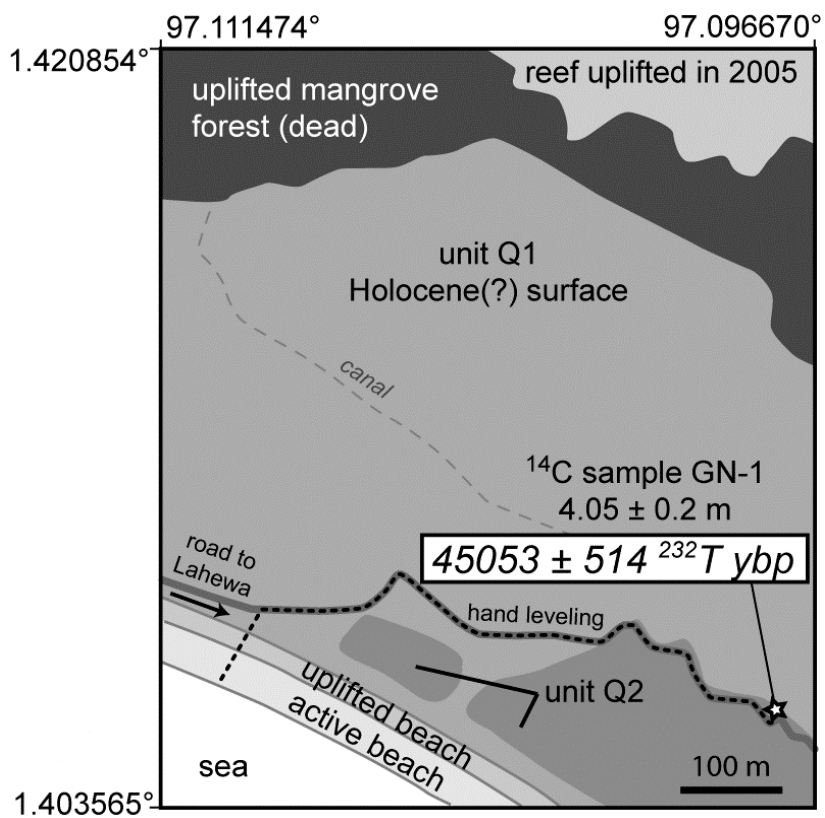
We did not obtain datable material at FOFO, and the transect does not extend across the entire width of the elevated surface, so we can only calculate a minimum uplift rate of $0.22 \pm .22$ mm/year here by assuming a maximum age of $6,500 \pm 500$ for the highest surface (table S1).



HGWL (Goat's Neck)

The extreme northwest tip of Nias is at maximum 20 m high and is composed of completely recrystallized coralline limestone. It is joined to the mainland by a broad, low ≤ 4 m high surface. We interpret the lowest beach sand and muds (unit Q1) as a Holocene-aged surface that laps onto the higher recrystallized coralline limestone. The low Holocene surface (unit Q1) is set into higher, eroded remnants of marine muds (unit Q2). Many of the Q2 deposits appear to represent mud-rich channels that now form inverted topography. Marine gastropods from one of these apparent paleochannels (sample GN-1) yielded a ^{14}C age of $45,000 \pm 514$ ybp; because this is near the limit of resolution for the radiocarbon method, these shells are probably much older.

Because of the inset relationship between unit Q1 and unit Q2, the elevation of sample GN-1 does not directly constrain uplift rates here. Thus we calculate a maximum $-0.2 \pm .23$ mm/year uplift rate of the ~ 4 m Holocene surface based on an assumed maximum $6,500 \pm 500$ year age for the surface, a 2005 coseismic uplift correction of 2.5 m, and a Holocene RSL correction of 1.62 m. It appears that unit Q1 closely marks the elevation of the mid-Holocene highstand, and thus we interpret the overall geomorphology and surface relations at the site as representing very little or no net Holocene tectonic uplift.

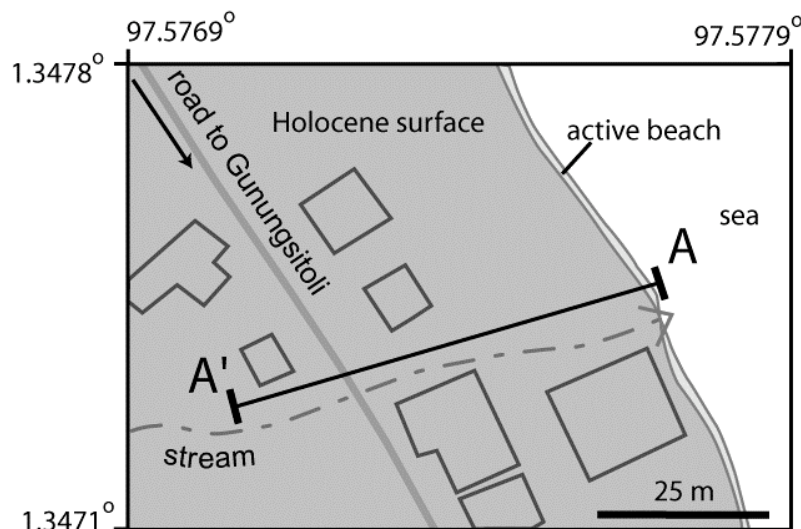


HGWL

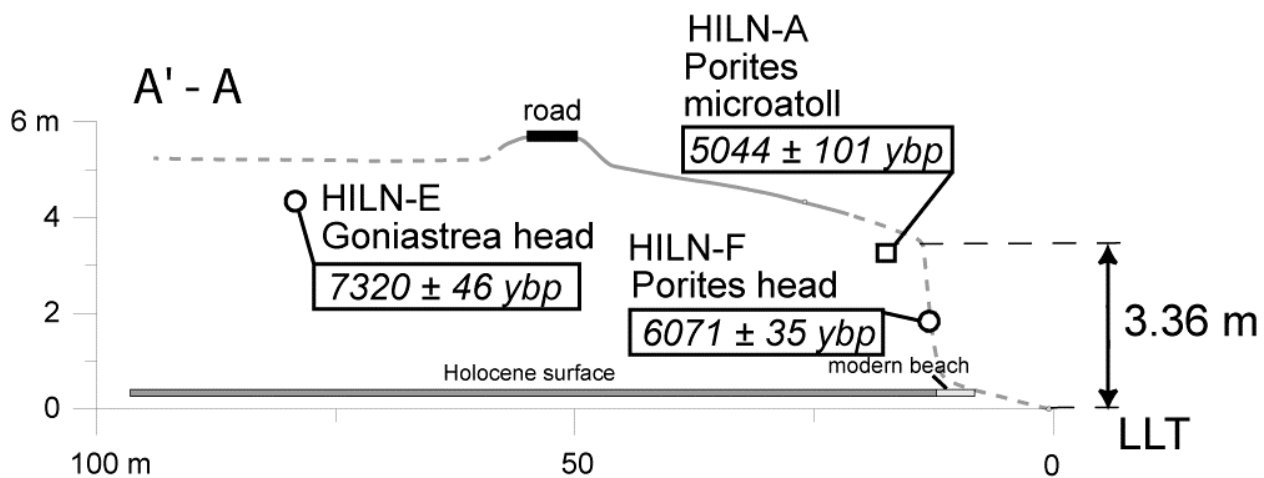
HILN (Hilinangea)

A well-defined coastal terrace runs along most of the northeastern coast of Nias. Site HILN is located on this surface about 15 km north of Gunungsitoli. A natural stream cut at the site exposes a clear transgressive/regressive coral and beach berm sequence, with several large porites microatolls marking the highest extent of paleo-low tide. Near the coast, we drilled a core into a 1.5 m diameter, slightly tilted microatoll (HILN-A) from which we obtained a U-Th date of 5045 ± 100 ybp. At the base of the coastal exposure, we sampled a non-microatoll Porites from which we obtained a date of 6070 ± 35 ybp. After applying corrections for 2005 coseismic uplift and Holocene RSL, we obtain an uplift rate estimate of $0.34 \pm .21$ mm/year from the uppermost microatoll HILN-A (table S1).

The highest and most landward in-situ coral we observed at the site was a large *Goniastrea* head (HILN-E) that yielded a date of 7320 ± 45 ybp. This is the oldest head we encountered on the raised Holocene terraces of Nias. This head may represent the beginning of the mid-Holocene highstand on the island. Alternatively, the sloping character of the Holocene surface here and the ~1 m elevation difference between samples HILN-E and HILN-A may reflect tectonic uplift between ~7.3 ka and ~5 ka. While abrupt coseismic uplift between ~7.3 and ~5 ka is possible, there is no obvious geomorphic feature – in particular a scarp and abandoned higher surface - that records uplift and abandonment of sample HILN-E after 7.3 ka. With this observation in mind, we favor the interpretation that head HILN-E marks the beginning of the Holocene highstand on Nias at ~7.3 ka. Use of this oldest, most landward head to calculate a minimum uplift rate yields $0.46 \pm .14$ mm/year, which overlaps within uncertainty with the $0.34 \pm .21$ mm/year rate calculated above from head HILN-A.



HILN (Hilinangea)



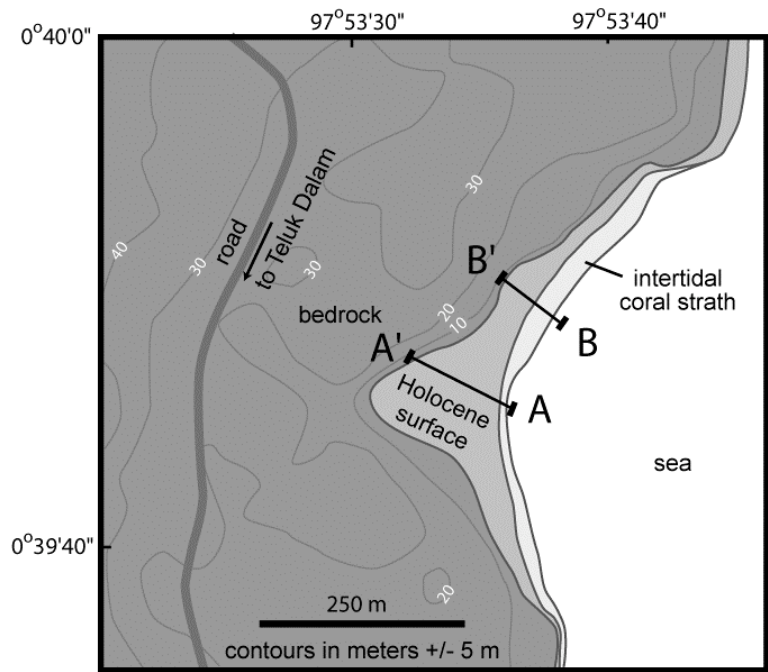
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HLWA (Hili'alawa)

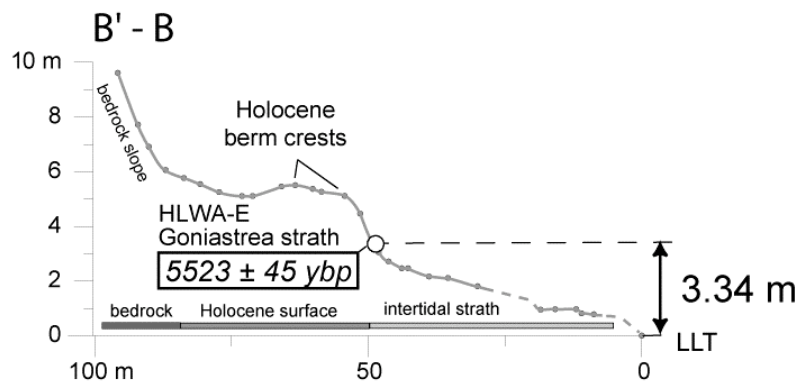
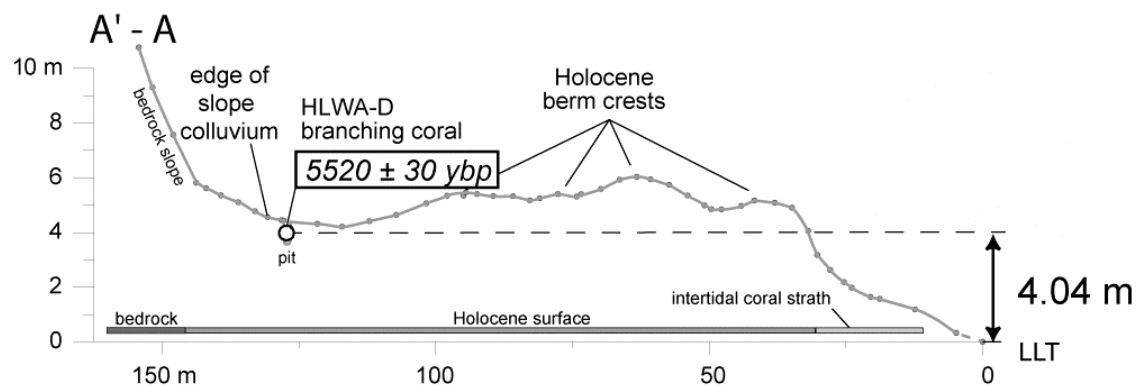
The HLWA site is located on the southeast coast of Nias on a Holocene surface that formed the floor of a small, shallow bay prior to abandonment. Two topographic transects begin along a prominent fossil coral strath with two distinct levels. The lowest level is active during normal tides, while the higher level is deeply dissected and karsted and appears to mark an uplifted and abandoned surface. During a period of especially high swell in June 2007 the higher surface was inundated during high tide.

Transect A-A' extends ~150 m across the raised platform at nearly its widest point. The surface is set into recrystallized coralline limestone that forms a steep slope at the landward end of the transect. A pit near the back of the transect exposed beach sands overlying coral rubble. We did not find an in-situ head here, but a date obtained on reworked branching coral confirms that the surface is younger than 5520 ± 35 ybp. The surface elevation is 4.04 m where the sample was obtained, and after application of corrections for 2005 coseismic uplift and Holocene RSL variation we obtain a maximum bound on the uplift rate of $0.59 \pm .17$ mm/year.

Transect B-B' crosses the same surface where it is only ~50 m wide. We sampled a Porites head that had clearly experienced erosion (HLWA-E) exposed in the sea cliff and thus it represents a minimum estimate of uplift. The age of this head (5523 ± 45 ybp) is remarkably similar to the branching coral sampled along transect A-A'. This sample yields a minimum net tectonic uplift rate of $0.47 \pm .17$ mm/year (table S1) after corrections are applied for 2005 coseismic uplift and Holocene RSL variation.



HLWA (Hili'alawa)



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HMAZ

The site HMAZ is located midway along the relatively inaccessible SW coast of Nias. The coast between Sirombu and Lagundri is marked by steep slopes and cliffs and a lack of clear elevated terraces, and site HMAZ is representative of the geomorphology encountered along this stretch.

Transect A-A' extends across a typical coastal section. A thin beach is buttressed directly against steep slopes of sandstone bedrock here, and the highest berms reach just over 4 meters above LLT elevation along the transect and do not form a continuous elevated surface along the coast. The exposure of the southwest coast to large seasonal swell from the Antarctic leads us to speculate that the higher berms are storm berms rather than a remnant Holocene surface.

Unfortunately, we did not obtain datable material from the berms, and the possibility remains that the highest berms are in fact Holocene in age. If we assume a maximum age of $6,500 \pm 500$ years for the berms, we obtain a net uplift rate of $0.25 \pm .23$ mm/year after applying a 2005 coseismic uplift correction of 1.25 m and a 1.88 m Holocene RSL correction (table S1).

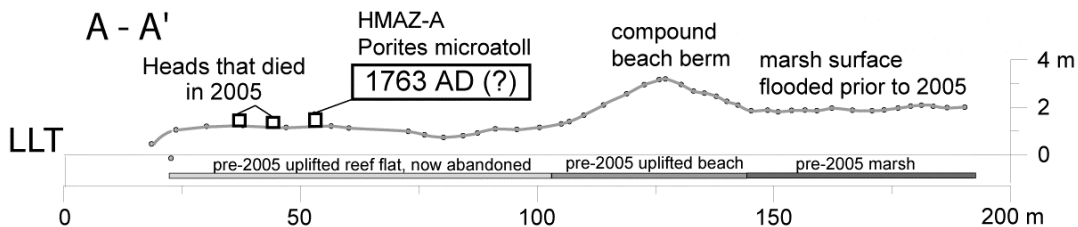
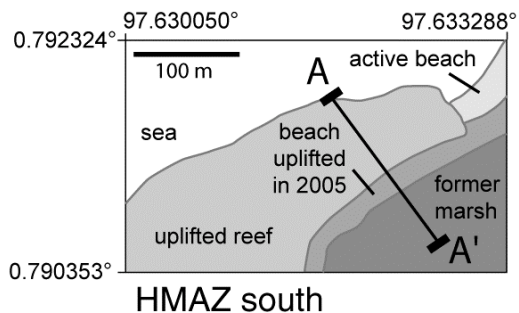
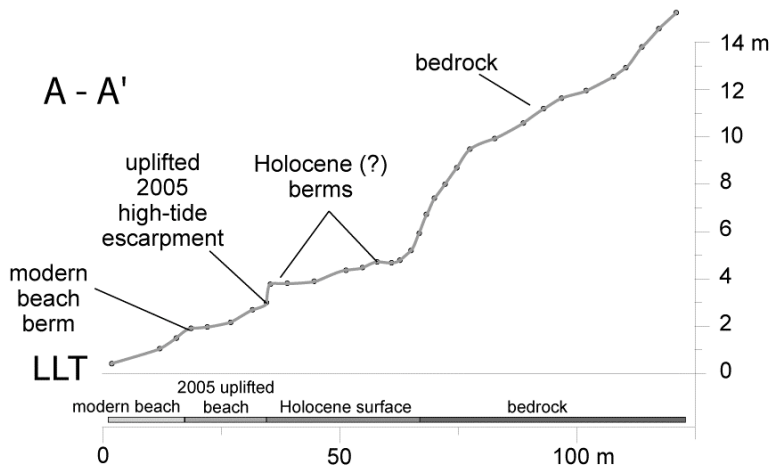
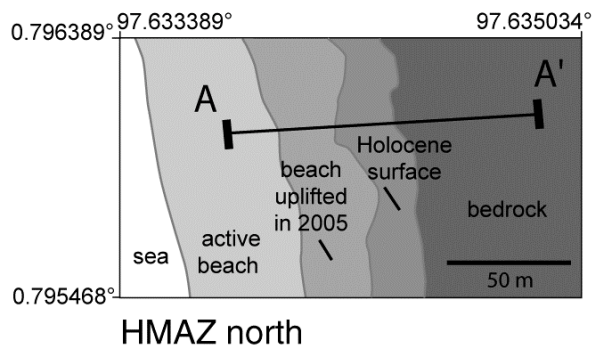
Transect B-B' is located on the southern arm of the bay 0.6 km south of transect A-A'. Transect B-B' crosses a broad reef that was exposed 2005, then continues across a ~3 m high compound berm and ends on a surface that was a low-lying marsh prior to uplift in 2005. The low-lying marsh surface continues landward beyond the transect to where it conformably abuts a bedrock slope. Similar to transect A-A', there is no evidence for a higher, preserved surface at the site, and the marsh surface currently elevated ~ 2 m above LLT appears to be a slowly-filling back-berm depression. The compound berm appears to reflect repeated re-occupation by sea at this elevation near the end of the past few seismic cycles, suggesting that the coastline has been recently stable.

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261 We did not find datable material along transect B-B' that we could use to estimate
262 the Holocene uplift rate. However, we did obtain a date from a coral head that was part
263 of a population of obviously older, slightly higher microatolls on the uplifted reef than
264 those that died in 2005. These heads were in general 10-20 cm higher than the heads that
265 died in 2005, and we originally speculated that these heads died during the 1861
266 earthquake, and that their slightly higher position, despite the overall lack of evidence of
267 uplift at the site, might give us an estimate of the variability in strain accumulation and
268 release at this site. Unfortunately, the head we sampled was contaminated with excess Th
269 and thus did not yield a very exact date. The coral head died between ~1670 and 1835
270 AD and so it probably did not die in 1861. A historical earthquake in 1763 has been
271 reported for Nias (Marsden, 1811) and it is possible that these heads were uplifted and
272 died then. More detailed paleoseismic work will be needed to test this idea.

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274 Given the lack of datable material at the site, we cannot reach firm conclusions
275 regarding the uplift rate here. However, several qualitative factors lead us to infer that
276 the coast is stable or even slowly subsiding. First, we did not observe convincing
277 evidence for elevated and abandoned Holocene surfaces. Second, the active beaches
278 along the coast here are narrow and plastered directly onto bedrock slopes, and chenier
279 plains that would reflect stability or slow uplift are absent. Finally, we did not observe
280 evidence for older, uplifted carbonates along the coast here, possibly reflecting slow
281 subsidence of southwest Nias over the past several hundred thousand years.



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284 ***HNKO (Hinako)***

285 Hinako is the administrative center of the small group of islands of the same name
286 off the central west coast of Nias. Hinako island comprises a 30-40 m central ridge of
287 recrystallized corraline limestone surrounded by a wide, flat elevated Holocene fringing
288 reef. A ~500 m transect (A-A') extends across the 2005 uplifted reef and onto the
289 elevated Holocene reef. We obtained U-Th dates from two microatolls along the
290 transect: sample HNKO-A, a *Goniastrea* microatoll, yielded an age of 3804 ± 23 ybp,
291 while HNKO-B, a *Porites* microatoll, was dated at 5776 ± 153 ybp. Elevation control is
292 best for the younger head (HNKO-A), which yields a net tectonic uplift rate of $0.63 \pm$ -
293 0.24 mm/year (table S1). The *Porites* head is farther inland and its elevation was
294 estimated by hand level to be nearly identical to sample HNKO-A. The paleoreef surface
295 is extremely level and continuous between the two samples. Like many other sites in this
296 study, the fact that we observe several thousands of years and hundreds of meters
297 between samples at the same elevation suggests a long period of net vertical stability in
298 the mid-Holocene, in this case between at least ~5800 and ~3800 years ago.

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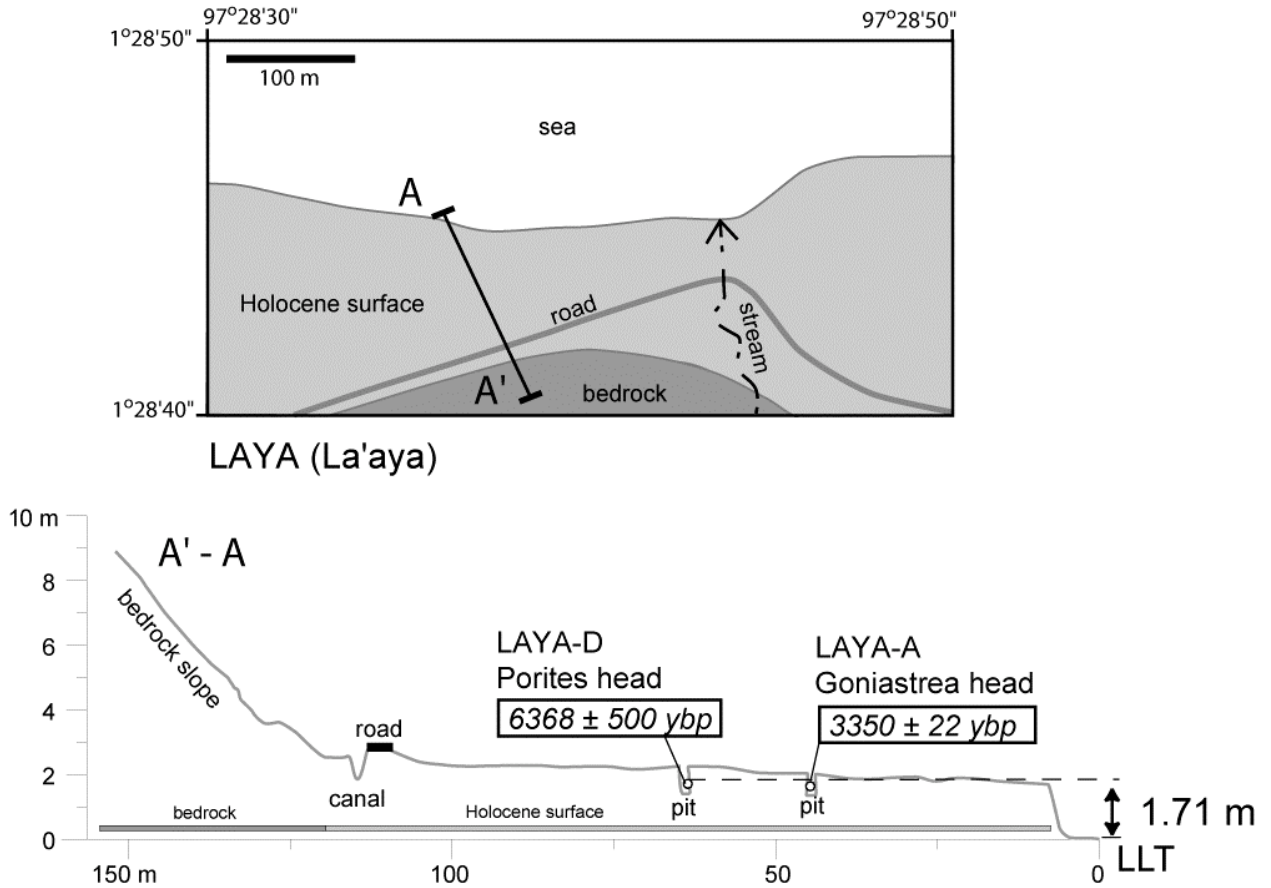
300 The seaward edge of the uplifted Holocene surface features at least three sets of
301 obviously descending berms and paleoreef surfaces. Based on sample HNKO-A, these
302 surfaces must be younger than ~3.8 ka. The stepwise abandoned surfaces may reflect the
303 interplay of descending sea level and coseismic uplifts in the late Holocene. If this is so,
304 the berm sets (3) severely underestimate the number of megathrust events (as many as
305 12-25 if the average recurrence is 150-300 years) since 3.8 ka.



LAYA (*La'aya*)

The LAYA transect is located on a narrow (125 m) portion of the broad elevated Holocene platform surrounding the northeasternmost point on Nias. This site experienced ~20 cm of coseismic subsidence in 2005, and a freshly undercut cliff at the coast exposes large massive coral heads covered by coarse coral rubble and sand. We dug pits at two sites along the transect that exposed two in-situ coral heads, a *Goniastrea* head (LAYA-A) and a *Porites* microatoll (LAYA-D). These heads yield dates of 3350 ± 20 ybp (LAYA-A) and 6370 ± 500 ybp (LAYA-D). We use the older microatoll (LAYA-D) to calculate a net uplift rate of $0.1 \pm .28$ mm/year here (table S1).

Samples LAYA-A and -D occur at nearly identical elevations, but the most seaward sample LAYA-A is ~3 ka younger than LAYA-D. The raised paleoreef is very flat from the coast until the point where it laps onto slate bedrock at its landward edge (shoreline angle), with no indication of cumulative or stepwise displacement preserved in the reef surface. The simplest explanation for these observations is that the paleoreef surface closely marks the elevation of the mid-Holocene highstand in the region, and that very little net tectonic motion has happened at the LAYA site since ~6.3 ka. Furthermore, the ~3 ka spread in the ages of the dated heads suggests that the Holocene highstand spanned at least this long, and was a broad, flat curve rather than a short, relatively high-amplitude pulse.

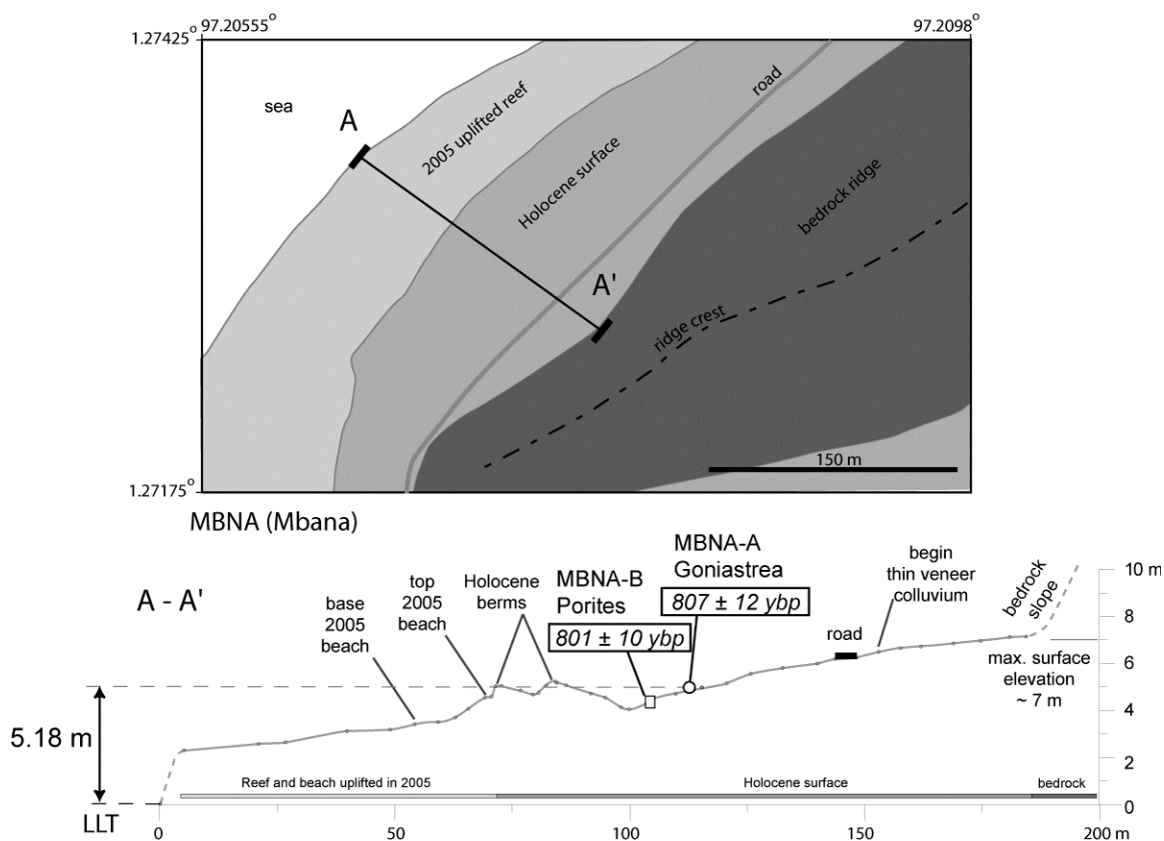


MBNA (Mbana)

The MBNA site is located on a prominent point ~4 km north of Afulu Bay on the NW coast of Nias. Coseismic uplift here was 2.34 m in 2005, and the point is now surrounded by a newly exposed ~50 – 250 m wide reef and coral strath surface. A prominent bedrock ridge composed of gently-dipping sandstone forms the center of the point. Transect A-A' extends from the recently exposed reef to the bedrock ridge. The transect crosses a gently sloping surface with prominent berms. Two U-Th dates from coral along the transect yielded nearly identical young ages: a Goniastrea head MBNA-A returned an age of 807 ± 12 ybp, and a Porites head MBNA-B is dated at 801 ± 10 ybp. This was a surprise; the expected ages for these heads was mid-Holocene, on the basis of comparison to a large number of other, similar sites on Nias.

If the young U-Th dates we obtain on samples MBNA-A and -B represent true recent uplift of in-situ heads, the site may represent an uplift rate as high as 2.5 – 3.1 mm/year (Table S1). However, several lines of evidence lead us to conclude that the heads sampled at MBNA are tsunami blocks and were only apparently in-situ. First, there were clearly other tsunami blocks at the site: several heads in the area were rejected for sampling because they were obviously not in-situ, and we had reservations about one of the heads we eventually dated (MBNA-A), which led us to submit two heads for analysis. It appears our worries were well-founded. Second, despite the apparent in-situ position of the MBNA-A and -B heads, they were not sitting on a coral strath or nestled among similar heads, and the coarse coral rubble and beach rock in which they were apparently rooted may have represented only surficial deposits. Third, the location of the blocks in a back-berm depression is consistent with the location of other tsunami blocks observed on Nias and Simeulue, and it appears that these depressions serve to trap large erratics when mobilized by tsunamis. Finally, it is impossible that a 2.5 – 3.1 mm/year uplift rate has been sustained during the Holocene at this site – if this were the case, the Holocene surface would extend to ~22 meters high. Instead, the maximum Holocene surface height is 7 meters. Alternatively, it is possible (but unlikely considering the observations above) that the two samples at MBNA represent coseismic uplift and abandonment of living corals ~800 years before present.

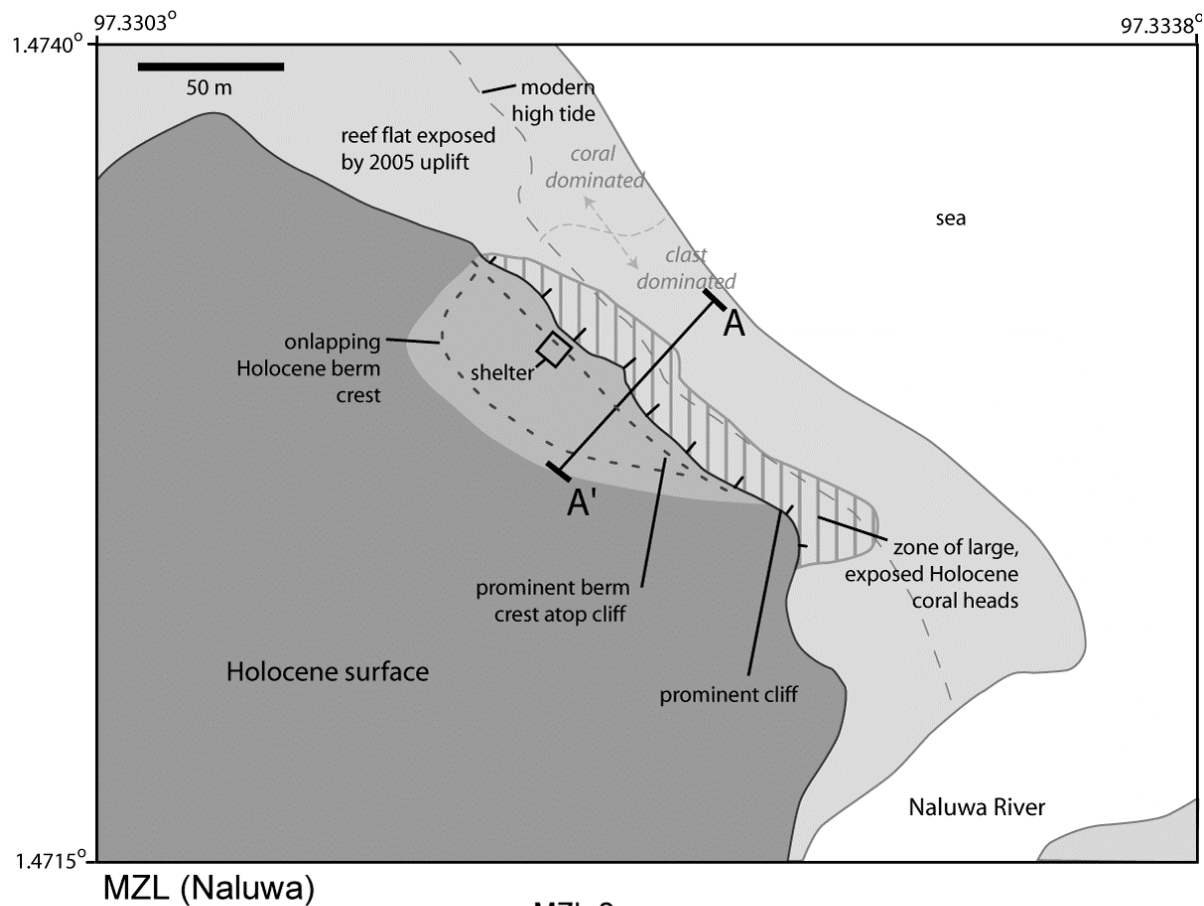
Because the sampled heads at this site appear to be tsunami erratics, we calculate a maximum uplift rate using the height of the Holocene terrace and an assumed maximum age of 6500 ± 500 for the surface. After applying a 2005 uplift correction of 2.34 m and a Holocene RSL correction of 1.62 m, we obtain a maximum uplift rate of $0.47 \pm .24$ mm/year here.



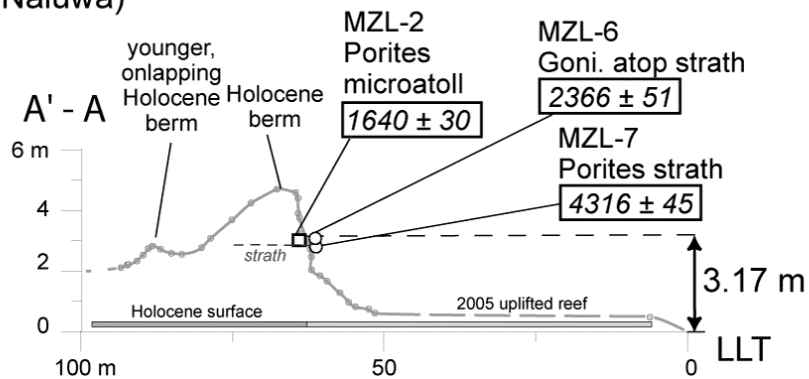
MZL (*Naluwa River*)

Site MZL is near the mouth of the Naluwa river on the central northern coast of Nias. Coseismic uplift of 0.7 m in 2005 caused an isolated patch of modern reef to be exposed here along an otherwise sandy stretch of coastline. We focused our investigation on a conspicuous 5-m-high cliff, paleoreef, and Holocene berm complex on the landward edge of the 2005 uplifted reef.

The cliff exposed a sequence of corals and coral rubble capped by beach sands. The lowermost massive corals form a strath surface, which is covered in succession by coral heads and microatolls, coral clasts, and finally a thick package of beach sand. We obtained the U-Th ages of three coral heads in the section. The massive basal corals yielded an age of 4316 ± 45 ybp (sample MZL-7). The minimum age of the strath surface is constrained at $2,366 \pm 51$ ybp by sample MZL-6, a small *Goniastrea* head that grew directly on the strath surface. For the purposes of measuring the uplift rate, the most important sample is an $1,640 \pm 30$ ybp *Porites* microatoll (sample MZL-2). This sample yields a net uplift rate of $1.1 \pm .55$ mm/year after application of a 2005 coseismic correction of 0.7 m and Holocene RSL correction of 0.67 m. This rate is surprisingly high considering that the site is located in an obvious syncline (Fig. 3) and nearby sites are uplifting at much lower rates or even subsiding. The site is located along a pronounced 0.5 km right-angle jog in the coastline, and it is possible that the localized uplift here reflects flexural slip within the syncline sometime after ~ 1.6 ka.



MZL (Naluwa)



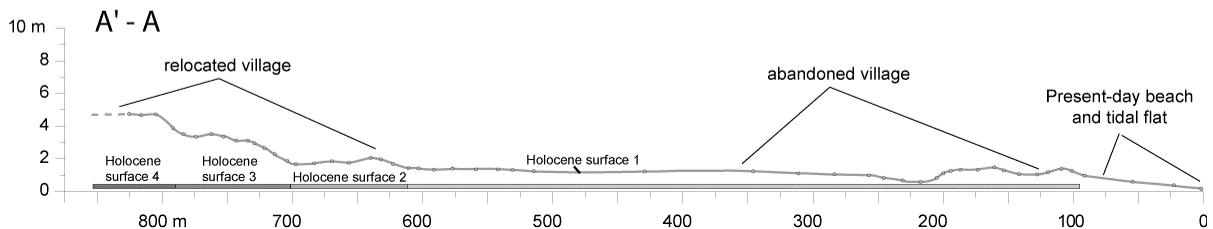
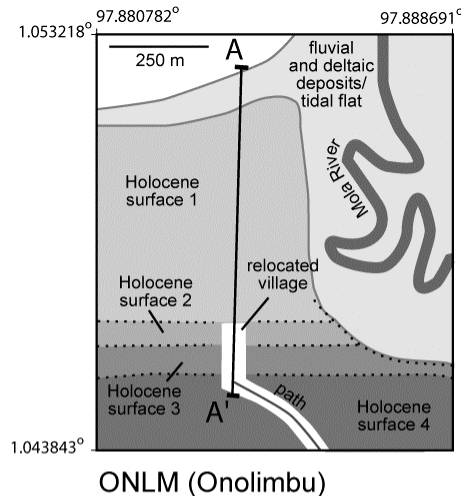
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ONLM (*Onolimbu*)

Site ONLM is situated on the eastern side of the prominent eastern coastal bulge. This area subsided tectonically 0.2 m in 2005. Localized secondary deformation led to apparent subsidence of a meter or more in places. Onolimbu and Tagaulei villages, which sit near the mouth of the Mola River, were particularly hard hit by secondary subsidence, and Tagaulei village has been relocated away from the lowest, most coastward surface.

Transect A-A' extends 800 m inland, and crosses a ~100 m wide modern muddy beach and tidal flat near the mouth of the Mola River before stepping up onto a series of low beach berms and a wide, sandy and muddy surface (Holocene surface 1). At about 600 m inland a series of berm sets (Holocene surfaces 2-4) step up to the highest surface at just under 5 meters above LLT. This highest surface extends inland for several kilometers.

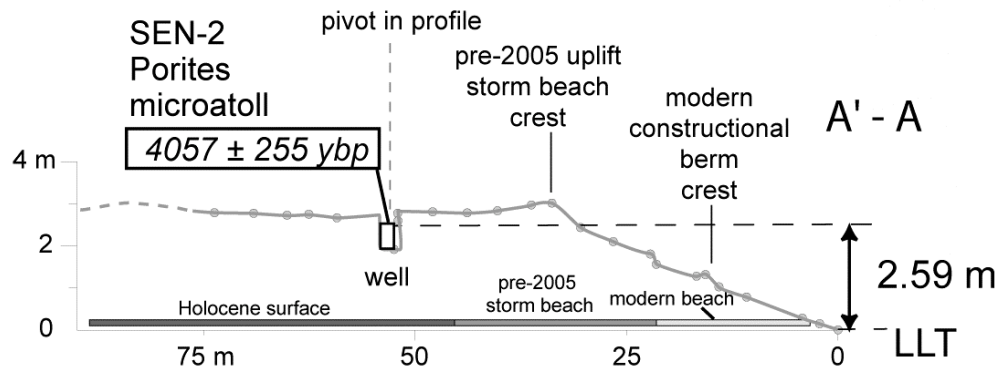
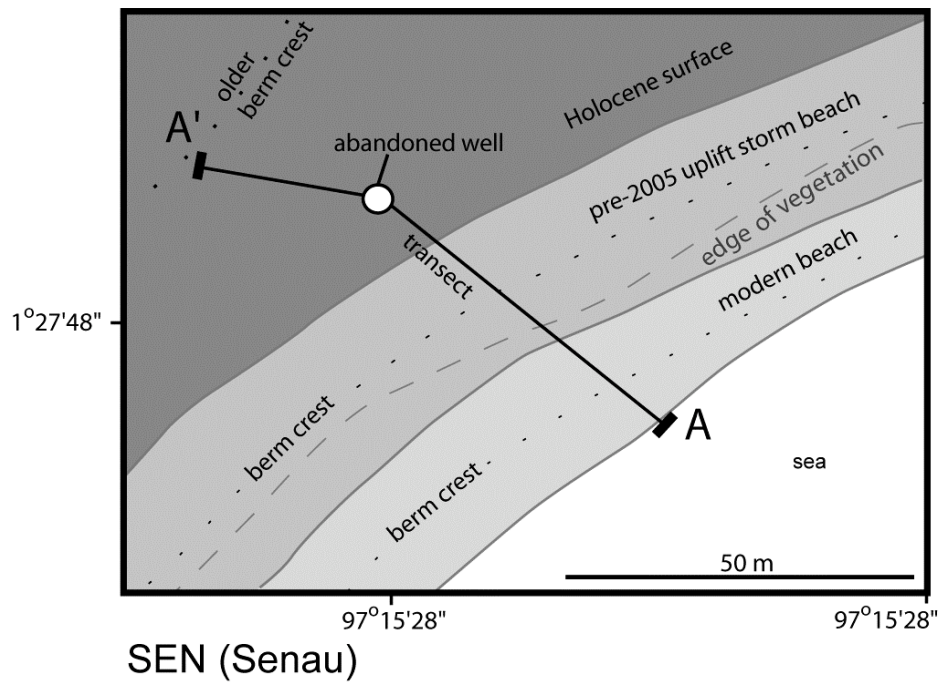
We did not obtain datable material from the ONLM transect. We infer a Holocene age for the highest surface based on the high degree of berm preservation and the continuity of this surface with other Holocene surfaces to the north and south. The site offers an important qualitative observation, which is that there is clear permanent tectonic uplift at a place that experienced high values of coseismic and secondary subsidence in 2005. The 2005 uplift signal is clearly not representative of the long-term uplift record here. Because we did not survey the maximum elevation of the Holocene surface, we can obtain only a minimum uplift rate of $0.32 \pm .23$ mm/year which probably substantially underestimates the actual Holocene uplift rate, as the Holocene surface climbs noticeably for several kilometers inland from the site.



SEN (*Pulau Senau*)

Senau is a small (3.2 km), elongate island off the north coast of Nias. Large lagoons in the island interior were completely drained by 1.55 m of coseismic uplift in March 2005. The uplift also caused shallow wells to become dry; fortuitously, one of these dry wells exposed a large, perfectly preserved *Porites* microatoll. Cross section A-A' shows a profile across a modern beach, the uplifted and abandoned 2005 beach, and the flat Holocene surface that makes up the bulk of the island. The U-Th age of the *Porites* microatoll (SEN-2) is 4057 ± 255 ybp. When corrected for 2005 coseismic uplift and Holocene RSL, the site yields a net tectonic uplift rate of $-0.14 \pm .22$ mm/year. Long-term stability or slow net subsidence of Senau is consistent with the overall low elevation of the island (< 3 m above LLT), the large lagoon in the interior of the island that fills near the end of the megathrust earthquake cycle, and the lack of elevated older coral in the island core. In this regard, Senau and the other islands along the north coast of Nias are very much like typical subsiding coral atolls.

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462 **TETE (Tetezou)**

463 Site TETE sits is on the southern margin of the prominent coastal plain that
464 bulges outward along the east coast of Nias. The lack of corals along this muddy stretch
465 of coast precluded their use to estimate uplift rates here. This is unfortunate because the
466 broad, uplifted plain here is similar to site GLMB in that it appears to be the location of
467 the highest-elevation Holocene surfaces, and thus highest net uplift rates, on Nias.

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A map and topographic profile near the village of Tetezou illustrates the character and extent of the abandoned Holocene surface along this portion of the coast. A cliff just over 8 meters high marks the seaward edge of the surface and exposes a nearly uniform package of clean beach sands with infrequent flattened pebbles. Low, broad beach berms extend inland for more than 500 m to where the surface reaches an elevation of nearly 11 meters.

To place a maximum limit on the age of the surface directly at the coast, we obtained a ^{14}C date on a gastropod shell fragment obtained from the beach deposits. The age of this sample, 3161 ± 65 ybp, corresponds to a minimum uplift rate of 0.94 ± 0.3 mm/year (keeping in mind that the surface elevation overestimates paleo-sea level). A maximum uplift rate of $1.41 \pm .29$ mm/year is obtained for the site by assuming a $6,500 \pm 500$ year age for the 10.8 m high surface.

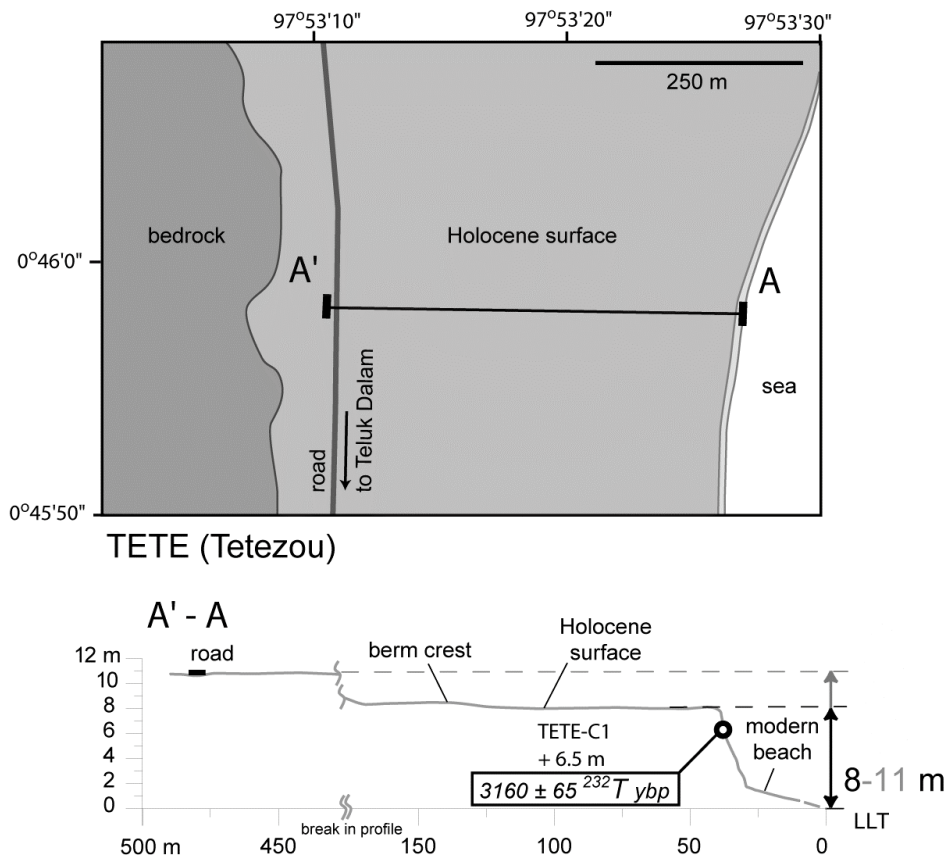


Table S1. Elevations and ages of material used to constrain Holocene uplift history on Nias

Site ^a	Sample ^b	Material ^c	Indicative value ^d	Bound on uplift rate	Dating method ^e	²³² Th Age $\pm 1\sigma^f$	Apparent uplift (m) ^g	2005 coseismic uplift (m) ^h	Raw uplift rate (mm/year) ⁱ	RSL correction (m) ^j	Net uplift (m) ^k	Net uplift rate (mm/yr) ^l
BAWF	BAWF-A	eroded <i>Porites</i>	below LLT	min	U/Th	4296 \pm 172.3	0.64 \pm .1	-0.3 \pm .3	0.22	1.45 \pm 1	-0.51	-0.12 \pm .18
	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	3.5 \pm .5	-0.3 \pm .3	0.58	1.88 \pm 1	1.92	0.30 \pm .21
BAWZ	BAWZ-C1	gastropod	-	n/a	¹⁴ C	6270 \pm 31.0	6 \pm .1	-0.25 \pm .3	1.00	1.88 \pm 1	4.37	0.62 \pm .13
	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	10 \pm .5	-0.25 \pm .3	1.58	1.88 \pm 1	8.37	1.29 \pm .29
DHNA	Holo. surf.	-	above LLT	min	inf.	6500 \pm 500.0	7 \pm .5	-0.25 \pm .3	1.12	1.88 \pm 1	5.37	0.83 \pm .25
FOFO	Holo. surf.	-	above LLT	min	inf.	6500 \pm 500.0	3.5 \pm .5	0.2 \pm .16	0.51	1.88 \pm 1	1.42	0.22 \pm .22
GLMB	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	11.5 \pm .5	-0.3 \pm .3	1.82	1.88 \pm 1	9.92	1.53 \pm .3
NGGS	GNGS-A	<i>Porites</i> micro	LLT	equal	U/Th	6390 \pm 89.4	4.73 \pm .1	0.24 \pm .06	0.70	1.39 \pm 1	3.1	0.49 \pm .17
	GNGS-B	<i>Goni.</i> non-micro	below LLT	min	U/Th	6205 \pm 39.7	4.58 \pm .1	0.24 \pm .06	0.70	1.44 \pm 1	2.9	0.47 \pm .17
	GNGS-C	<i>Porites</i> non-micro	below LLT	min	U/Th	6901 \pm 48.9	0.62 \pm .1					n/a
HGWL	GN-1	gastropods	unk	max	¹⁴ C	44996 \pm 514.0	4.05 \pm .5					
	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	4 \pm .5	2.5 \pm .06	0.23	1.62 \pm 1	-0.12	-0.02 \pm .22
HILD	HILD-A	<i>Goni.</i> micro	LLT + 0.1 m	max	U/Th	6862 \pm 46.5	3.68 \pm .1	0.21 \pm .06	0.51	1.35 \pm 1	2.02	0.29 \pm .15
	HILD-B	<i>Porites</i> non-micro	below LLT	min	U/Th	6991 \pm 137.1	4 \pm .1	0.21 \pm .06	0.54	1.34 \pm 1	2.45	0.35 \pm .16
HILN	HILN-A	<i>Porites</i> micro	LLT	equal	U/Th	5044 \pm 101.5	3.36 \pm .1	0.05 \pm .06	0.66	1.6 \pm 1	1.71	0.34 \pm .21
	HILN-E	<i>Goni.</i> non-micro	below LLT	min	U/Th	7320 \pm 46.0	4.34 \pm .1	0.05 \pm .06	0.59	0.94 \pm 1	3.35	0.46 \pm .14

Site ^a	Sample ^b	Material ^c	Indicative value ^d	Bound on uplift rate	Dating method ^e	²³² Th Age $\pm 1\sigma$ ^f	Apparent uplift (m) ^g	2005 coseismic uplift (m) ^h	Raw uplift rate (mm/year) ⁱ	RSL correction (m) ^j	Net uplift (m) ^k	Net uplift rate (mm/yr) ^l
	HILN-F	<i>Porites</i> non-micro	below LLT	min	U/Th	6071 \pm 35.2	2.36 \pm .1					n/a
HLWA	HLWA-D	detrital coral clasts	above LLT	max	U/Th	5520 \pm 30.2	4.04 \pm .1	-0.25 \pm .16	0.78	1.02 \pm 1	3.27	0.59 \pm .17
	HLWA-E	<i>Porites</i> non-micro	below LLT	min	U/Th	5523 \pm 45.1	3.34 \pm .1	-0.25 \pm .16	0.65	1.02 \pm 1	2.57	0.47 \pm .17
HMAZ	HMAZ-A	<i>Porites</i> micro	Killed in 1763?	n/a	U/Th	243 \pm 50.0						n/a
	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	4.75 \pm .5	1.25 \pm .16	0.54	1.88 \pm 1	1.62	0.25 \pm .23
HNKO	HNKO-A	<i>Goni.</i> micro	LLT + 0.1 m	equal	U/Th	3804 \pm 23.4	5.74 \pm .1	1.75 \pm .19	1.05	1.5 \pm 1	2.39	0.63 \pm .24
	HNKO-B	<i>Porites</i> micro	LLT	equal	U/Th	5776 \pm 152.9	6 \pm .1	1.75 \pm .19	0.74	1 \pm 1	3.25	0.56 \pm .17
HUMN	HUMN-A	<i>Porites</i> micro	LLT	equal	U/Th	6529 \pm 44.4	6.63 \pm .1	0.24 \pm .06	0.98	1.37 \pm 1	5.02	0.77 \pm .16
LAYA	LAYA-A	<i>Goni.</i> non-micro	below LLT	min	U/Th	3350 \pm 21.7	1.64 \pm .1	-0.1 \pm .16	0.52	1.42 \pm 1	0.32	0.10 \pm .28
	LAYA-D	<i>Porites</i> non-micro	below LLT	min	U/Th	6368 \pm 500.3	1.71 \pm .1	-0.1 \pm .16	0.28	1.44 \pm 1	0.37	0.06 \pm .15
LGND	LGND-A	<i>Porites</i> micro	LLT	equal	U/Th	5982 \pm 60.2	0.59 \pm .1	0.78 \pm .3	-0.03	0.93 \pm 1	-1.12	-0.19 \pm .13
	LGND-C1	mollusc atop LGND-A	max age regression	n/a	¹⁴ C	4510 \pm 68.0						n/a
LHWA	LHW-A	<i>Porites</i> in strath	below LLT	min	U/Th	1,815 \pm 46	0.85 \pm .1	2.47 \pm .3	-0.89	0.67 \pm 1	-0.95	-0.52 \pm .41
	LHW-B	<i>Porites</i> micro	LLT	equal	U/Th	550 \pm 62.5	1.36 \pm .1	2.47 \pm .3	-2.02	0.19 \pm 1	-1.11	-2.02 \pm 1.2
	LHW-peat1	mollusc atop strath	max age strath abnd	n/a	¹⁴ C	255 \pm 70.0						n/a

Site ^a	Sample ^b	Material ^c	Indicative value ^d	Bound on uplift rate	Dating method ^e	²³² Th Age $\pm 1\sigma^f$	Apparent uplift (m) ^g	2005 coseismic uplift (m) ^h	Raw uplift rate (mm/year) ⁱ	RSL correction (m) ^j	Net uplift (m) ^k	Net uplift rate (mm/yr) ^l
	LHW-peat2	base of peat on strath	min age strath abnd	n/a	¹⁴ C	290 \pm 135.0						n/a
MBNA	MBNA-A	<i>Porites</i> non-micro	tsunami block?	n/a	U/Th	807 \pm 12.0	5.18 \pm .1	2.34 \pm .16	3.52	0.32 \pm 1	2.52	3.12 \pm 1.21
	MBNA-B	<i>Goni.</i> non-micro	tsunami block?	n/a	U/Th	801 \pm 10.2	4.67 \pm .1	2.34 \pm .16	2.91	0.32 \pm 1	2.01	2.51 \pm 1.21
	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	7 \pm .5	2.34 \pm .16	0.72	1.62 \pm 1	3.04	0.47 \pm .24
MZL	MZL-6	<i>Goni.</i> atop strath	min age strath abnd	n/a	U/Th	2,365.6 \pm 51.3	3.2 \pm .1	0.7 \pm .23	1.06	0.85 \pm 1	1.65	0.70 \pm .38
	MZL-2	<i>Porites</i> micro	LLT	equal	U/Th	1640 \pm 29.8	3.17 \pm .1	0.7 \pm .23	1.51	0.67 \pm 1	1.8	1.10 \pm .55
	MZL-7	strath surface	max age strath abnd	min	U/Th	4,316.2 \pm 44.9	3.15 \pm .1	0.7 \pm .23	0.57	1.82 \pm 1	0.63	0.15 \pm .2
ONLB	Holo. surf.	-	above LLT	min	-	6500 \pm 500.0	4.75 \pm .5	-0.2 \pm .16	0.76	2.88 \pm 1	2.07	0.32 \pm .23
SEN	SEN-2	<i>Porites</i> micro	LLT	equal	U/Th	4057 \pm 255.2	2.59 \pm .1	1.55 \pm .16	0.26	1.62 \pm 1	-0.58	-0.14 \pm .22
SIFI	SIFI-A	<i>Porites</i> non-micro	below LLT	min	U/Th	6208 \pm 344.8	1.6 \pm 2.	0.48 \pm .06	0.18	1.44 \pm 1	-0.32	-0.05 \pm .47
	SIFI-B	<i>Porites</i> micro	LLT	equal	U/Th	5561 \pm 43.6	1.57 \pm .1	0.48 \pm .06	0.20	1.5 \pm 1	-0.41	-0.07 \pm .19
	SIFI-C	<i>Porites</i> micro	LLT	equal	U/Th	2046 \pm 27.2	1.45 \pm .1	0.48 \pm .06	0.47	0.84 \pm 1	0.13	0.06 \pm .51
SRMB	SRMB-A	<i>Goni.</i> non-micro	above LLT	max	U/Th	6764 \pm 53.7	5.05 \pm .1	2.56 \pm .16	0.37	0.71 \pm 1	1.78	0.26 \pm .14
TDLU	TDLU-B	<i>Goni.</i> non-micro	below LLT	min	U/Th	6307 \pm 44.7	4 \pm .1	-0.25 \pm .16	0.67	0.84 \pm 1	3.41	0.54 \pm .15
TETE	Holo. surf.	-	above LLT	max	inf.	6500 \pm 500.0	10.75 \pm .5	-0.3 \pm .3	1.70	1.88 \pm 1	9.17	1.41 \pm .29
	TETE-C1	gastropod	max age surface	n/a	¹⁴ C	3161 \pm 65.0	8 \pm .1	-0.3 \pm .3	2.63	1.7 \pm 1	6.6	0.94 \pm .3

Site ^a	Sample ^b	Material ^c	Indicative value ^d	Bound on uplift rate	Dating method ^e	²³² Th Age $\pm 1\sigma$ ^f	Apparent uplift (m) ^g	2005 coseismic uplift (m) ^h	Raw uplift rate (mm/year) ⁱ	RSL correction (m) ^j	Net uplift (m) ^k	Net uplift rate (mm/yr) ^l
WNGA	WNGA-1	<i>Goni.</i> non-micro	tsunami block	max	U/Th	715 \pm 11.7	2.28 \pm .1	1.81 \pm .19	0.66	0.27 \pm 1	0.2	0.28 \pm 1.28
	WNGA-2	<i>Goni.</i> non-micro	below LLT	min	U/Th	6270 \pm 53.5	5.07 \pm .1	1.81 \pm .19	0.52	0.87 \pm 1	2.39	0.38 \pm .15

^a See Fig. 2 for site locations. Rows in grey are used to calculate uplift rates and appear in Table 1; remaining are stratigraphic control

^b Holo. surf = age of surface assumed; other samples in Tables 2 and 3

^c Goni. = Goniastrea; micro = microatoll

^d LLT = lowest low tide

^e U/Th dates reported in table 2, ¹⁴C dates in table 3, and remaining are inferred maximum ages of abandoned surfaces

^f Age for all samples is reported here with respect to 2007

^g Non-corrected measurement of total apparent uplift

^h 2005 coseismic uplift at site from Briggs et al., 2006

ⁱ Uplift rate with only 2005 coseismic correction applied

^j Holocene RSL correction from Peltier et al., 2004; we apply an assumed uncertainty of ± 1 m

^k Net uplift = apparent uplift - 2005 coseismic uplift - RSL correction

^l Net uplift rate = Net uplift/²³⁰Th age. Uncertainties are estimated by including the full range of uncertainties for each value.